PATENT SPECIFICATION 700,379

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COMPLETE SPECIFICATION.

Improvements in or relating to Anchoring Devices for Use in Fixing Articles to Walls or the like.

We, THE RAWLPLUG COMPANY LIMITED, of Rawlplug House, Cromwell Road, South Kensington, London, S.W.7, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to anchoring devices for use in fixing articles to walls or the like, and is particularly concerned with devices adapted for use in cases where the wall or the like is of relatively thin sheet material, for example, wall-board, and access can be had only to the face of the wall to which the article is to be secured. Devices for this purpose are described in our prior Patent No. 622,288.

One of the objects of the present invention is to provide an improved anchoring device for use in cases where one face only of the wall or partition is open to the workman, and where it is essential, or desirable that a hermetic seal shall be provided wherever a fixing hole in such wall is formed, for example, in the walls or partitions of pressurized aircraft.

According to the invention, in one illustrative embodiment thereof, the improved anchoring device comprises a resiliently deformable sleeve of non-metallic material, one end of such tube being closed and the other end open, a nut element held within the sleeve against relative axial or rotational movement therein and situated at a point within the sleeve displaced from the two ends thereof, and a threaded fixing member adapted to pass freely through the open end of the sleeve and engage the nut element therein.

The invention may be carried into practice as shown in the accompanying drawing, in which :

Figure 1 is a side elevation of an anchoring device in accordance with the invention ;

Figure 2 is an end view of the device shown in Figure 1 ;

Figure 3 is a view similar to Figure 1, but showing the device in its anchoring position ;

Figure 4 is a central section through the device shown in Figure 1, but to an enlarged scale ; and

Figure 5 is a sectional view similar to Figure 4, showing an alternative form of anchoring device according to the invention.

As shown in the drawing, the improved anchoring device comprises a resiliently deformable sleeve 1 of non-metallic material such as indiarubber, one end 2 of such sleeve being closed and the other end thereof being open and being provided with an outwardly extending flange 3, and a nut element 4 held within the sleeve against relative axial or rotational movement therein. The nut 4 is situated within the sleeve 1 at a point displaced from the closed end 2 and the flanged end 3 thereof, and is provided with a screw-threaded bore 5 adapted to be engaged by a threaded fixing member 8 which passes freely through the open end of the sleeve.

The nut element 4, when engaged by the threaded fixing element 8, is caused thereby to move towards the open end of the anchoring device, thus causing outward buckling or deformation of the part of the wall of the sleeve between the nut element 4 and the rear surface of a wall 7 through a hole in which the sleeve 1 has been inserted When the fixing element 8 is tightened, this deformed part of the wall of the resilient sleeve 1 forms a resilient washer 6 (Figure 3) between the rear surface of the wall 7 and the nut element 4, whereby the hole in the wall is hermetically sealed against passage of air or gases around the outer periphery of the anchoring device, and the article to be

secured to the front surface of the wall is firmly held in desired position. The closed inner end 2 of the sleeve 1, in which is received the inner end of the threaded fixing element 8 as the latter is tightened in engagement with the nut element, prevents the passage of air or gases through the sleeve, thus completing the hermetic sealing of the hole in the wall or the like.

Advantageously, the thickness of the wall of the sleeve 1, in the part thereof between the nut element 4 and the flanged open end 3 thereof, is relatively small, as shown, so as to facilitate outwards deformation thereof, and the thickness of the wall between the nut element 4 and the closed end 2 of the sleeve is desirably such as to provide a reduced central bore 9 of such diameter as to enable the inner end of the threaded fixing element 8 to engage the wall of such bore by means of its screwthreads and thus lock the element 8 against loosening by vibration. The nut element 4, which is of a hard material such as metal or vulcanised fibre, is either formed initially with a screwthread 5 or is such that the bolt or screw 8 forming the fixing element 8 may cut its own thread therein. The nut element 4 is secured in the sleeve 1 in any convenient manner, e.g. by being bonded or vulcanised thereto, by seating the hexagonal or other exterior peripheral shape of the nut element in a correspondingly-shaped annular recess in the main surface of the wall of the sleeve, or by the provision of projections, beads, etc. on the nut element engaging the sleeve to prevent axial or rotational movement of the nut in the sleeve when engaged by the fixing element.

The deformable sleeve may be of any desired cross-sectional shape, such as circular, square, hexagonal or any other shape, and preferably has a flange or bead 3 at its open end to prevent the sleeve being passed entirely through the hole in the wall 7.

In the alternative form of anchoring device shown in Figure 5, the sleeve 1, with one closed end 2 and one flanged open end 3, is provided with a bolt element 10, the head 11 of which is secured in the sleeve adjacent the closed end 2 thereof in a manner similar to the nut element 4 of the anchoring device illustrated in Figures 1 to 4, the screwthread end 12 of the bolt projecting outwardly from the open end 3 of the sleeve, so as to be capable of being engaged by a nut 13, whereby the sleeve 1 may be compressed against the inner surface of the wall 7 to deform the wall thereof in a similar manner to that described with reference to Figures 1 to 4 of the drawing.

What we claim is :—

1. An improved anchoring device for use in fixing articles to relatively thin structural members, comprising a resiliently deformable sleeve of non-metallic material, one end of such sleeve being closed and the other end open, and a threaded element held within the sleeve against relative axial or rotational movement therein and adapted to be engaged by a co-operating threaded element to cause axial contraction of the sleeve.

2. An anchoring device according to Claim 1, wherein the threaded element held within the sleeve is in the form of a nut mounted within the sleeve at a location therein displaced from the two ends thereof.

3. An anchoring device according to Claim 2, wherein the thickness of the wall of the sleeve between the nut element and the closed end of the sleeve is the maximum permissible to allow a central bore therein sufficient to receive freely the inner end of a threaded fixing element.

4. An anchoring device according to any of the preceding claims, wherein the thickness of the wall of the sleeve between the open end thereof and the threaded element held within the sleeve is relatively small so as to facilitate outwards deformation thereof.

5. An anchoring device according to any of the preceding claims, wherein the sleeve is formed of indiarubber.

6. An anchoring device according to any of the preceding claims, wherein the open end of the sleeve is provided with an outwardly extending flange.

7. An anchoring device according to any of the preceding claims, wherein the threaded element held within the sleeve is bonded to the interior surface thereof.

8. An anchoring device according to any of the preceding claims, wherein the threaded element held within the sleeve has shaped outer surfaces engaging with correspondingly shaped surfaces formed in a recess in the inner surface of the sleeve.

9. An anchoring device according to Claim 1, wherein the threaded element held within the sleeve is a headed bolt, the screwthreaded end of which extends freely out of the open end of the sleeve.

10. An anchoring device according to any of Claims 1 to 8, wherein the thickness of the wall of the sleeve between its closed end and the nut element is such that a central bore is provided of such diameter that its wall is engaged and a screwthread cut thereon by the threaded end of the fixing element.

11. The improved anchoring device substantially as described with reference to Figure 4 or to Figure 5 of the accompanying drawing.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Anchoring Devices for Use in Fixing Articles to Walls or the like.

We, THE RAWLPLUG COMPANY LIMITED, of Rawlplug House, Cromwell Road, South Kensington, London, S.W.7, a British Company, do hereby declare this invention to be described in the following statement :—

This invention relates to anchoring devices for use in fixing articles to walls or the like, and is particularly concerned with devices adapted for use in cases where the wall or the like is of relatively thin sheet material, for example, wall-board, and access can be had only to the face of the wall to which the article is to be secured. Devices for this purpose are described in our prior Patent No. 622,288.

One of the objects of the present invention is to provide an improved anchoring device for use in cases where one face only of the wall or partition is open to the workman, and where it is essential, or desirable that a hermetic seal shall be provided wherever a fixing hole in such wall is formed, for example, in the walls or partitions of pressurised aircraft.

A further object of the invention is to provide anchoring devices of the same general type as those described in our said Patent No. 622,288, but so designed as to facilitate and reduce the cost of manufacture thereof.

According to the invention, in one illustrative embodiment thereof, the improved anchoring device comprises a resiliently deformable sleeve of non-metallic material, one end of such tube being closed and the other end open, a nut element held within the sleeve against relative axial or rotational movement therein and situated at a point within the sleeve displaced from the two ends thereof, and a threaded fixing member adapted to pass freely through the open end of the sleeve and engage the nut element therein.

The nut element, when engaged by the threaded fixing element, is caused thereby to move towards the open end of the anchoring device, thus causing to buckle or be deformed outwardly the part of the wall of the sleeve between the nut element and the rear surface of the wall through a hole in which the sleeve has been inserted. When the fixing element is tightened, this deformed part of the wall of the resilient sleeve forms a resilient washer between the rear surface of the wall and the nut element, whereby the hole in the wall is hermetically sealed against passage of air or gases around the outer periphery of the anchoring device, and the article to be secured to the front surface of the wall is firmly held in desired position. The closed inner end of the sleeve, in which is received the inner end of the threaded fixing element as the latter is tightened in engagement with the nut element, prevents the passage of air or gases through the sleeve, thus completing the hermetic sealing of the hole in the wall or the like.

Advantageously, the thickness of the wall of the sleeve, in the part thereof between the nut element and the open end thereof, is relatively small, so as to facilitate outwards deformation thereof, and the thickness of the wall between the nut element and the closed end of the sleeve is desirably the maximum to allow a central bore sufficient freely to receive the inner end of the threaded fixing element. The nut element, which is of a hard material such as metal or vulcanised fibre, is either formed initially with a screw-thread or such that the bolt or screw forming the fixing element may cut its own thread therein. The nut element is secured in the sleeve in any convenient manner, e.g. by being bonded or vulcanised thereto, by seating the hexagonal or other exterior peripheral shape of the nut element in a correspondingly-shaped annular recess in the main surface of the wall of the sleeve, or by the provision of projections, beads, etc. on the nut element engaging the sleeve to prevent axial or rotational movement of the nut in the sleeve when engaged by the fixing element.

The deformable sleeve may be of any desired cross-sectional shape, such as circular, square, hexagonal or any other shape, and preferably has a flange or bead at its open end to prevent the sleeve being passed entirely through a hole in a wall.

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700,379 COMPLETE SPECIFICATION
1 SHEET
This drawing is a reproduction of the Original on a reduced scale.

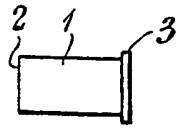

Fig. 1.

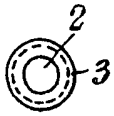

Fig. 2.

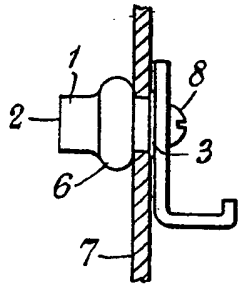

Fig. 3.

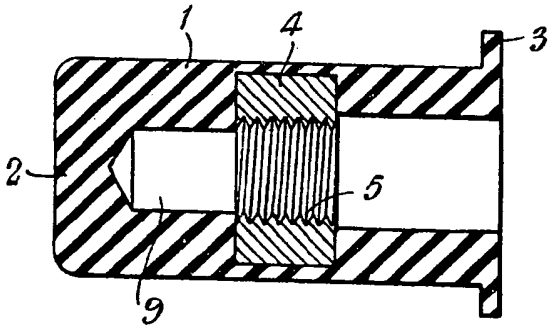

Fig. 4.

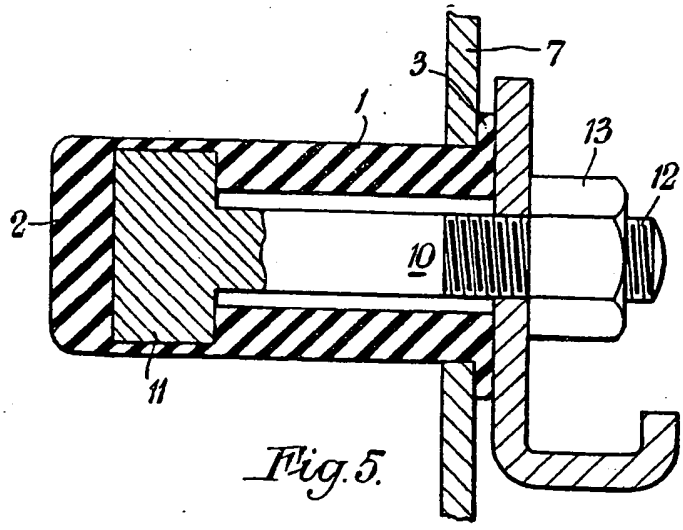

Fig. 5.